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USE
ALPHA CEMENT
FOR
HIGH
EARLY STRENGTH
CONCRETE



ALPHA PORTLAND
CEMENT COMPANY
EASTON, PA. CHICAGO, ILL.



High Early Strength Concrete

Theoretical? Yes;
But Practical Also
by using
Alpha Portland Cement

Alpha Portland Cement Company

Easton, Pa.

Chicago, Ill.

Boston

New York

Philadelphia

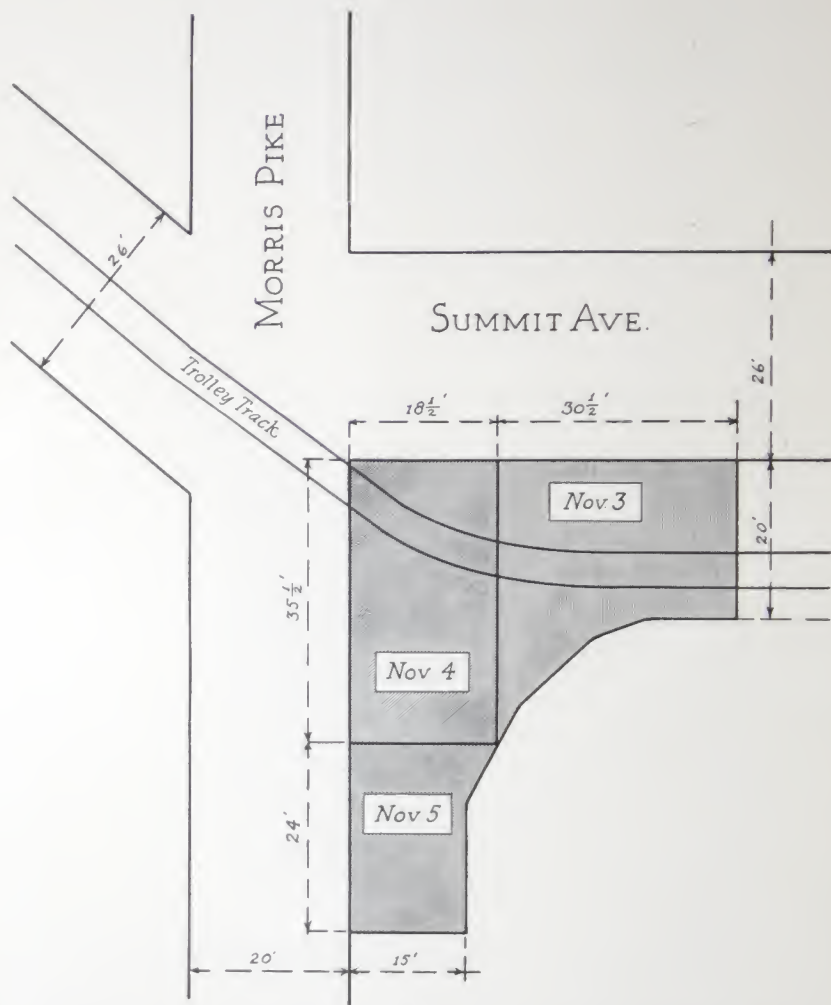
Baltimore

Pittsburgh

St. Louis

Battle Creek, Mich.

Ironton, Ohio



Sketch of the high early strength concrete placed Nov. 3, 4 and 5, 1926, at Phillipsburg, N. J.

High Early Strength Concrete

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WE, of the Alpha Portland Cement Company, have heard a great deal about high early strength cement, super cement, high alumina cement, etc., all varying in greater or less degree from Portland cement manufactured under A. S. T. M. standard specifications. Thirty-six years' experience in the manufacture of Alpha Portland Cement has convinced us that cement manufactured to meet the A. S. T. M. specifications will generally more than meet the requirements of the average user. Where the user wishes a high early strength concrete, we are also convinced that our regular cement is best from the practical viewpoint.

The water cement ratio which was developed in the laboratory of the Portland Cement Association in Chicago provides a means whereby the user of cement may get a concrete of high early strength without being required to take the many precautions which are necessary when special cements are used. To test out our conviction theoretically, the Alpha Portland Cement Company made some experiments during 1926 on quick hardening or high early strength concrete.

Samples from our cement at Martins Creek, Pa., and at Catskill, N. Y., (regular stock in both instances) were taken to the Engineering Laboratory of Lafayette College. Under supervision of that laboratory a series of cylinders were made from these cements with various amounts of water and various mixes of cement, sand and stone. A mix of one part cement, one and a half parts sand and two and a half parts crushed stone or gravel with five and one-half gallons of water per sack of cement was used and compared with the same mix using 4.4 gallons of water per sack of cement. The compressive strength of the cylinders from these two cements were as follows:

MARTINS CREEK, PA., PLANT

Gallons of water per Sack of Cement	1 day	3 days	7 days	28 days
5.5	728	1976	2551	4658
4.4	1476	2898	4145	5775

CATSKILL, N. Y., PLANT

5.5	570	1928	2905	4602
4.4	1059	2558	3996	5470

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The dry mixture being shoveled into place

Another series of tests were made with a mix of one part cement, two and a half parts sand and four parts crushed stone or gravel with 7.7 gallons of water per sack of cement and compared with a series of the same mix using 6.1 gallons of water per sack of cement, with the following results:

MARTINS CREEK, PA., PLANT				
Gallons of Water per Sack of Cement	1 day	3 days	7 days	28 days
7.7	421	836	1614	3008
6.1	654	1518	2142	3812

CATSKILL, N. Y., PLANT				
7.7	182	978	1798	2575
6.1	617	1512	2515	3342

The tensile strengths of these cements made according to standard methods follow:

MARTINS CREEK, PA., PLANT	
1 part cement, 3 parts Standard Ottawa Sand	
Pounds per square inch,	3 days—266
	7 days—301
	28 days—396

High Early Strength Concrete

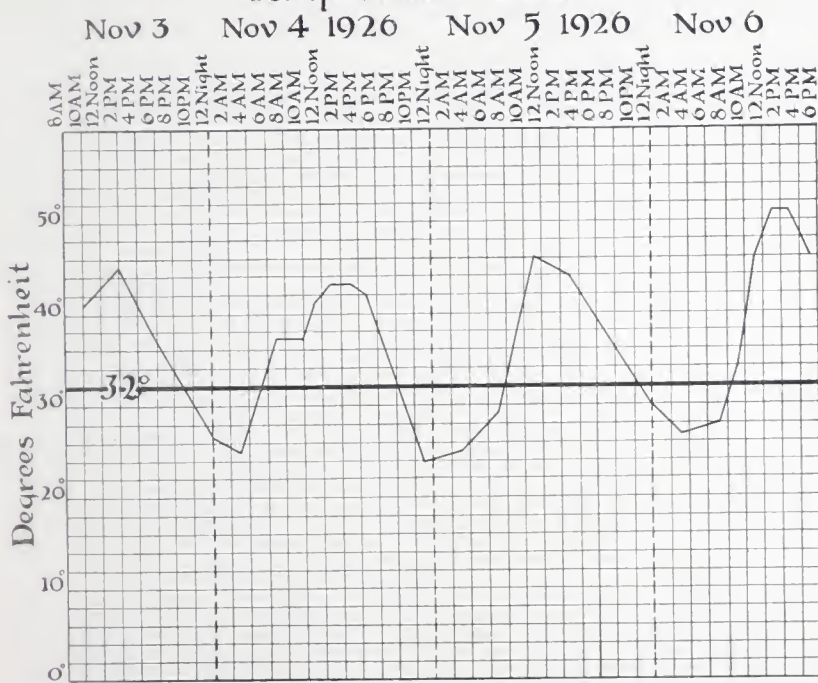
CATSKILL, N. Y., PLANT

1 part cement, 3 parts Standard Ottawa Sand
Pounds per square inch, 3 days—258
7 days—339
28 days—441

These results indicate plainly the advantage of "dry mix" over "wet mix." Other mixes than those shown were also used and in every instance the lowering of the water content gave similar higher strength at early ages over the ordinary quantity of water. In developing these facts, over 1,000 concrete cylinders 8" x 16" were made and broken on the compression machine. These results satisfied us that standard Alpha Portland Cement without question would do all and more than most users of cement might require.

The next thing was to apply the principle practically and see whether the theoretical results would be found in actual practice. In the early fall of 1926, the City of Phillipsburg, N. J., planned to pave with concrete a small intersection at Meadow Avenue and Morris Pike. This Company procured permission from the Phillipsburg authorities

Temperature Chart



Range of temperature during progress of work. It will be observed that freezing weather occurred each night

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A slump test on the job



The cylinders made from batches of the mixture. A canvas and straw covering used to protect the green concrete

High Early Strength Concrete ∞



Truck loaded with sand, total weight of 17,100 lbs. on road at end of 24-hour period

(Street Commissioner John Laughland and City Engineer Harry Meixell) to have this intersection put down with a mix planned for high early strength concrete and with the understanding that it should be opened for traffic not more than three days after the concrete was poured, and sooner if we felt such action was warranted.

It was expected that the concrete would be laid in the early part of October before the weather should turn cold. Unfortunately, one thing after another came up to hinder the progress of the work and it was not until the first week in November that the contractor (Korp & Korp of Phillipsburg) was ready to pour the concrete. There was some question whether it was wise to make the practical test under such circumstances, because most Highway Engineers are unwilling to have a concrete pavement laid under such conditions. However, the management of the Alpha Company felt that if it was right in its belief as to the value of this method of making concrete, it would be just that much better should the concrete be laid under abnormal and disadvantageous conditions, and so went ahead with the construction. The contractor was not equipped to lay the whole intersection in one day and, therefore, the work was carried on for three days before the job was completed. At the end of forty-eight hours the concrete appeared to be sufficiently hard from superficial tests to warrant traffic. It was necessary, however, to finish the balance of the intersection before the road could be opened,

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Ready for the truck test over sharp edge of the green concrete at end of 48 hours. The weather was cold and none too favorable for the test but the new slab bore the truck weight of 17,100 lbs. without the slightest evidence of weakness

but for our own satisfaction a truck weighing, with load, 17,100 pounds, was run upon the twenty-four hour concrete and pulled up over the edge of the forty-eight hour concrete, without marring the edge of the concrete or disturbing in the slightest the broom marks of the finisher. Twenty-four hours after the final section was laid, the road was open to traffic and has been in service ever since. The broom marks on the concrete are still as plain as when the concrete was first used.

The road happens to be one that is very heavily travelled (4,000 vehicles daily, New Jersey census) so that this particular concrete has been used almost continuously. About twenty days after the concrete was laid, the Highway Department of the State of New Jersey took two cores. These two cores were crushed twenty-eight days after the concrete was placed and gave strengths in compression of 4187 pounds per square inch and 4611 pounds per square inch respectively.

Mr. H. Eltinge Breed, a prominent Highway Engineer, made a careful examination of this pavement the latter part of November and writes as follows:

"On November 27, 1926, a close observation of this section revealed its integrity with clear, sharp cut broom marks in the surface, despite the fact that this intersection is in the city on a trunkline leading north-

High Early Strength Concrete ∞



Walter P. Lewis, Engineer of Tests, measuring depression in loose earth made by truck weighing 17,100 lbs., which was pulled up over the edge of the forty-eight hour concrete without marring the edge

easterly to Belvidere and Washington, and also serving the northeastern suburbs of the city which have considerable mixed traffic."

We are firmly convinced that where necessary it is possible with standard Alpha Portland Cement to pour concrete and use it in from twenty-four to seventy-two hours. Where it is desired to use concrete twenty-four or forty-eight hours after it is placed a somewhat richer mixture in cement than is ordinarily used (8 to 15%) is indicated. The mixing time should be increased. In this particular case each batch was in the mixer five minutes. We are satisfied that practically the same results may be obtained by mixing for not more than three minutes. Care should be taken in cold weather to heat the aggregate and water and to see that the aggregate is well graded. The cement used was the regular standard Alpha Portland Cement which we manufacture and sell to the trade. There was nothing special in its method of manufacture or in its composition.

Using this method there is no reason why cement concrete should not be the preferred material for city streets. Even with the slight additional cost for cement and time of mixing this pavement will be much cheaper than competitive material.

It is valuable furthermore for any other construction which is

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wanted quickly after the concrete is poured. In repair work about the mills of the Alpha Portland Cement Company it is a rare thing for concrete not to be in use forty-eight hours after it is poured and not infrequently twenty-four hours is the limit.

To those interested we will be glad to send a pamphlet giving the engineering and technical details of the construction described.

Easton, Pa.
March, 1927



Cold enough for overcoats and radiator covers! The gentlemen shown standing on the finished job are (left to right) John Laughland, Street Commissioner of Phillipsburg, N. J., Frank Korp, of Korp & Korp, Contractors, Phillipsburg, N. J., Louis Anderson, Jr., Chemical Engineer, Alpha Portland Cement Company, Easton, Pa.

Alpha Portland Cement Company

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	Ironton, Ohio		

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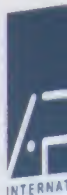
whether the construction is wanted in two days or two weeks

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